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## Egg-Associated *Salmonella* Serotype Enteritidis Infection in Northwestern States--2003

### Background

As of May 7, 19 cases of *Salmonella* serotype Enteritidis (SE) were reported to the Alaska Section of Epidemiology in 2003, a >300% increase in the average number of annual SE cases reported in Alaska since 1998. Other northwestern states also experienced similar trends this year.

### Salmonella Facts

An estimated 1.4 million cases of salmonellosis occur each year in the United States (US), although only about 40,000 cases are reported annually. SE is one of the two most common serotypes in the US (1). Human infection is characterized by fever, abdominal cramps, and diarrhea (sometimes bloody), and is caused by consumption of contaminated food or water, or contact with infected animals or humans. The ovaries of healthy appearing hens can be infected with SE, contaminating eggs before the shells are formed. The consumption of raw or inadequately cooked Grade A whole-shell eggs accounts for roughly 75% of SE infections (2).

### SE in Washington and Idaho

Earlier this year, the Washington State Department of Health conducted a case-control study and found that individuals who ate either whole or undercooked eggs outside of the home were at least nine times as likely to become ill compared to the controls (3).

The Idaho Department of Health investigated a foodborne outbreak of SE that occurred at a banquet in March, which also appeared to be associated with the consumption of eggs (4).

The US Food and Drug Administration (FDA) performed traceback investigations associated with these outbreaks and found that at least one common supplier (Supplier A) had SE contaminated chicken houses.

### SE in Alaska

Most Alaska SE reports this year were from sporadic cases without associated ill contacts; however, three clusters were investigated. One cluster in January involved two case-patients who were close contacts with each other. Epidemiologic evidence suggested person-to-person transmission between the two individuals. Eggs consumed by the index patient prior to illness onset were traced back to Supplier A.

Another cluster of SE disease occurred among household members in Anchorage in April. Four household contacts developed symptoms compatible with salmonellosis and all tested positive for SE. Based upon this epidemiologic investigation, person-to-person spread of illness appeared to be the source of infection for three of the four persons. It is unclear how the index patient, a baker, became infected. No traceback was performed.

The final cluster occurred in Anchorage and involved two adolescents who both became ill on March 3, two days after consuming cake batter that contained raw eggs. Both tested positive for SE. No traceback was performed.

### Comparing Strains

The Alaska State Public Health Laboratory performs DNA "fingerprinting" method using Pulsed-field Gel Electrophoresis (PFGE) on all *E. coli* 0157:H7, *Shigella*, *Listeria monocytogenes*, *Campylobacter*, and nontyphoidal *Salmonella* isolates. PFGE patterns for these bacteria are submitted by all 50 states electronically to CDC and can be compared rapidly with other patterns in a large database to help determine if individual infections are related or if an outbreak is occurring. This national network of public health laboratories is called PulseNet (5).

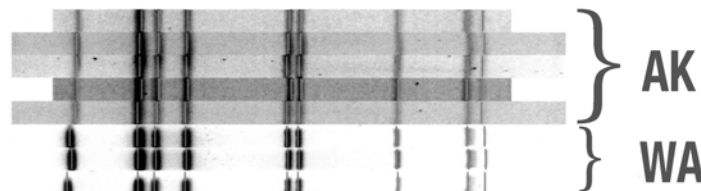
The Washington and Idaho outbreaks had matching PFGE patterns and PFGE patterns from 13 of the 19 Alaska SE cases reported this year matched the WA and ID outbreak strain. Figure 1 shows five of the Alaska PFGE matches with the WA outbreak strain.

### Discussion

Despite the similarities in PFGE patterns between states, SE is very homogeneous, often resulting in indistinguishable PFGE patterns of epidemiologically unrelated specimens. Because of the low epidemiologic sensitivity of PFGE with SE, it is unclear if the PFGE-matched SE cases in Alaska originated from the same source as the outbreak strains seen in other states this year.

Because SE was never cultured from eggs during the traceback investigation, FDA did not recommend a formal egg recall from Supplier A. However, in early May, Supplier A voluntarily began diverting eggs from the contaminated chicken houses for pasteurization (which requires first cracking and pooling eggs) until extensive testing is completed that meets FDA safety standards. Because eggs from contaminated chicken houses were diverted, FDA officials state that Supplier A eggs (commonly sold in Alaska) are no more likely to contain SE than shell eggs from other suppliers.

**Figure 1. Matching PFGE patterns from five Alaska and three Washington-outbreak SE case-patients this year.**



### Recommendations

1. Eggs should be refrigerated at  $\leq 45^{\circ}$  F ( $\leq 7^{\circ}$  C) at all times.
2. Discard cracked or dirty eggs.
3. Wash hands, cooking utensils, and food-preparation surfaces with soap and water after contact with raw eggs.
4. Eat eggs promptly after cooking. Do not keep eggs warm for more than 2 hours.
5. Avoid eating undercooked (any portion still liquid) eggs.
6. In food service establishments, raw eggs may not be pooled unless used immediately. Use of pasteurized egg products or pasteurized in-shell eggs are recommended in place of pooled eggs in hospitals, nursing homes, and senior centers.
7. Report all cases of salmonellosis to the Section of Epidemiology at 907-269-8000 during business hours or 800-478-0084 after hours.
8. For more information on food safety, refer to <http://www.state.ak.us/local/akpages/ENV.CONSERV/food.home.htm>.

### References

1. [http://www.cdc.gov/ncidod/dbmd/diseaseinfo/salmonellosis\\_t.htm](http://www.cdc.gov/ncidod/dbmd/diseaseinfo/salmonellosis_t.htm). Accessed on 5/8/2003.
2. Outbreaks of *Salmonella* serotype enteritidis infection associated with eating shell eggs--United States, 1999-2001. MMWR 2003; 51(51-52):1149-52.
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4. Idaho Disease Bulletin, April 2003, 10(1):3-4.
5. <http://www.cdc.gov/pulsenet/>. Accessed on 5/8/2003.